WHAT IS CLAIMED IS:

1. A substrate processing apparatus which comprises a light source, a light transmitting window which transmits light from the light source, and a reaction chamber capable of being evacuated, and in which a substrate to be processed is placed in the evacuated reaction chamber so as to oppose the light transmitting window with a spacing therebetween, and at least a surface to be processed of the substrate, which opposes the light transmitting window is processed by using a reaction which occurs when the light from the light source is irradiated into the reaction chamber through the light transmitting window,

comprising a driving mechanism which moves the substrate relative to the light transmitting window in a direction parallel to the surface to be processed, wherein a width of the light transmitting window in the direction in which the substrate moves relative to the light transmitting window is smaller than a length of the substrate in the moving direction.

2. A substrate processing apparatus which comprises a light source, a plurality of light transmitting windows which transmit light from the light source, and a reaction chamber capable of being evacuated, and in which a substrate to be processed is placed in the evacuated reaction chamber so as to

oppose the light transmitting windows with a spacing therebetween, and at least a surface to be processed of the substrate, which opposes the light transmitting windows is processed by using a reaction which occurs when the light from the light source is irradiated into the reaction chamber through the light transmitting windows,

comprising a driving mechanism which moves the substrate relative to the light transmitting windows in a direction parallel to the surface to be processed, wherein a width of each of the light transmitting windows in the direction in which the substrate moves relative to the light transmitting windows is smaller than a length of the substrate in the moving direction.

3. An apparatus according to claim 2, wherein the light transmitting windows are juxtaposed in a first direction.

4. An apparatus according to claim 2, wherein the light transmitting windows are juxtaposed in a first direction and a second direction different from the first direction.

5. An apparatus according to claim 4, wherein the light transmitting windows are arranged into a check pattern.

6. An apparatus according to claim 1, wherein the driving mechanism swings the substrate with respect to the light transmitting windows.

7. An apparatus according to claim 2, wherein the driving mechanism swings the substrate with respect to the light transmitting windows.

8. An apparatus according to claim 7, wherein the light transmitting windows are juxtaposed in the swinging direction such that widths of the light transmitting windows in the swinging direction are constant, and intervals between adjacent light transmitting windows in the swinging direction are constant, and a stroke of the swing by the driving mechanism is larger than a repeating interval which is a sum of the width in the swinging direction of the light transmitting window and a width in the swinging direction of a beam formed between adjacent light transmitting windows.

9. An apparatus according to claim 2, wherein the light transmitting windows are juxtaposed in the moving direction such that intervals between adjacent light transmitting windows in the moving direction are not uniform.

10. An apparatus according to claim 1 or 2, wherein the driving mechanism moves the substrate in one direction with respect to the light transmitting windows.

11. An apparatus according to claim 10, wherein a length of the reaction chamber in the moving direction is more than twice a length of the substrate

in the moving direction.

12. An apparatus according to claim 1 or 2, wherein the reaction chamber has a gate valve, at least one sub-reaction chamber different from the reaction chamber is placed adjacent to the reaction chamber via the gate valve, and the driving mechanism moves the substrate in one way from the reaction chamber to the sub-reaction chamber over the gate valve.

13. An apparatus according to claim 1 or 2, wherein the light source is a low-pressure mercury lamp.

14. An apparatus according to claim 1 or 2, wherein the light source is a rare gas excimer lamp.

15. An apparatus according to claim 14, wherein the light source is a xenon excimer lamp.

16. A substrate processing method comprising steps of:

placing a substrate to be processed in an evacuated reaction chamber of a substrate processing apparatus comprising a light source, at least one light transmitting window which transmits light from the light source, and the reaction chamber capable of being evacuated, such that the substrate opposes the light transmitting window with a spacing therebetween;

irradiating the reaction chamber by the light from the light source through the light transmitting window, while moving the substrate relative to the light

transmitting window such that the substrate is parallel to the light transmitting window; and

processing at least a surface to be processed of the substrate, which opposes the light transmitting window, by a reaction which occurs when light from the light source is irradiated into the reaction chamber.

17. A method according to claim 16, which further comprises steps of:

preparing a substrate to be processed having a surface to be processed which is at least partially made of a semiconductor; and

forming an ambient containing at least oxygen gas in the reaction chamber,

wherein the step of processing at least the surface to be processed of the substrate comprises a step of oxidizing the surface to be processed by using active oxygen atoms formed by the reaction which occurs when light from the light source is irradiated into the reaction chamber, thereby forming an insulating film on the substrate.

18. A method according to claim 16, which further comprises a step of forming, in the reaction chamber, an ambient of a gas of a compound having an atom which belongs to group 14 of the periodic table or a gas mixture containing the gas, an ambient of a gas mixture containing a gas of a compound having an atom which belongs to group 13 of the periodic table and a gas of

a compound having an atom which belongs to group 15 of the periodic table, an ambient of a gas mixture containing a gas of a compound having an atom which belongs to group 12 of the periodic table and a gas of a compound having an atom which belongs to group 16 of the periodic table, or an ambient of a gas containing at least a silicon compound gas,

wherein the step of processing at least the surface to be processed of the substrate comprises a step of forming a semiconductor film on the substrate by the reaction which occurs when light from the light source is irradiated into the reaction chamber.

19. A method according to claim 16, wherein photo-oxidation, photo-CVD, photo-ashing, photo-cleaning, photo-etching, or photo-epitaxy is used as the reaction which occurs when the interior of the reaction chamber is irradiated with the light from the light source through at least one light transmitting window.

20. A method according to any one of claims 16 to 18, wherein at least two of photo-oxidation, photo-CVD, photo-ashing, photo-cleaning, photo-etching, and photo-epitaxy are continuously performed without breaking a vacuum.